

**Remarks**

The Office Action dated 4 February 2002 and the Advisory Action dated 18 April 2002 have been received and reviewed. Claims 94-96 have been added. Applicants incorporate by reference the arguments submitted in the Response Under 37 C.F.R. § 1.116 dated 4 April 2002. The pending claims are claims 64-96. Reconsideration and withdrawal of the rejections are respectfully requested.

**New Claims**

Applicants have added new claims 94-96 to more clearly claim the present invention. No new matter has been added.

**The 35 U.S.C. § 103(a) Rejection**

The Examiner rejected claims 64-93 under 35 U.S.C. § 103(a) as being unpatentable over Tsai et al. (U.S. Patent No. 5,486,266) in view of Thiel (U.S. Patent No. 4,316,765). Applicants traverse this rejection and submit that claims 64-93 are not *prima facie* obvious in view of the cited references for at least the following reasons.

**The Tsai et al. Document**

Applicants respectfully submit that Tsai et al. does not render the pending claims of the present invention *prima facie* obvious for at least the following reasons.

Applicants submit that the claims of the present invention are not *prima facie* obvious in light of Tsai et al. because Tsai et al. does not teach or suggest all of the claim elements. For example, Tsai et al. does not teach or suggest a composition that is within the ranges recited in the claims of the present invention. Further, Tsai et al. does not teach or suggest the etch rates that are recited in claims, e.g., new claim 68.

Regarding the recited chemical composition, claim 64, for example, recites an etching composition including a mineral acid, a peroxide, and deionized water at a ratio in a range of about 1:1:35 to about 1:1:5. The present invention utilizes the following commercially available

concentrations of mineral acids: HCl is 37% by weight in deionized water; HNO<sub>3</sub> is 70% by weight in deionized water; H<sub>2</sub>SO<sub>4</sub> is 96% by weight in deionized water; H<sub>3</sub>PO<sub>4</sub> is 85% by weight in deionized water; and HF is 49% by weight in deionized water. See Specification, page 9, lines 20-27. The specification can be used in interpreting claim language when the specification provides definitions for terms appearing in the claims. See M.P.E.P. § 2111.01 (citing *In re Vogel*, 422 F.2d 438, 441, 164 U.S.P.Q. 619, 622 (C.C.P.A. 1970)). Suitable peroxides include hydrogen peroxide, which is utilized in the present invention at a commercially available concentration of 29% by weight in deionized water. See *id.* at page 10, lines 4-6. Therefore, the ratios recited in, e.g., claim 64 refer to ratios of commercially available concentrations of the respective compositions. For example, a ratio of 1:1:35 (mineral acid:peroxide:deionized water) includes a ratio of 1 part 37% by weight HCl, 1 part 29% by weight hydrogen peroxide, and 35 parts deionized water (e.g., as recited by claim 65).

In contrast, Tsai et al. teaches chemical compositions that utilize a 90% by volume commercially available concentration of hydrogen peroxide. Clearly, because Tsai et al. teaches compositions having a 90% by weight concentration of hydrogen peroxide as compared to a 29% by weight concentration as recited in the claims of the present invention, Tsai et al. does not teach or suggest the same elements as those recited in the present invention.

For example, claim 65 of the present invention recites that the mineral acid of claim 64 is HCl and the peroxide is hydrogen peroxide; therefore, claim 65 recites an etching composition that includes 1 part 37% by weight HCl and 1 part 29% by weight hydrogen peroxide. Tsai et al., on the other hand, recites a mixture containing 1 part 38% by volume HCl and 1 part 90% by volume hydrogen peroxide. Clearly, a 1:1 ratio of 37% HCl to 29% hydrogen peroxide (i.e., claim 65) is considerably different than a 1:1 ratio of 38% HCl to 90% hydrogen peroxide (i.e., Tsai et al.).

Further, Tsai et al. does not teach or suggest any etch rates for the disclosed compositions. Instead of etching, Tsai et al. is concerned with cleaning the surface of a partially manufactured integrated circuit.

However, even though Tsai et al. does not teach or suggest etch rates, the Examiner alleged that the composition taught by Tsai et al. would inherently have the same etch rates as the claimed invention because it contains the same chemicals and with the same ratio as that of the claimed invention. Applicants traverse this allegation.

As mentioned above, the chemical compositions taught by Tsai et al. are not the same as those claimed in the present invention. If the prior art teaches the identical structure, then and only then are properties applicant claims necessarily present. *See In re Spada*, 911 F.2d 705, 709, 15 U.S.P.Q.2d 1655, 1658 (Fed. Cir. 199). Because Tsai et al. teaches concentrations of hydrogen peroxide that are different than those recited in the present invention, the chemical compositions taught by Tsai et al. are not identical in structure to those recited in the present claims. The concentrations of components of a composition are clearly part of the structure. In this case, the concentrations of Tsai et al. and the present invention are different. Therefore, Tsai et al. does not inherently teach the etch rates claimed in the present invention.

Further, Applicants are not asserting that all claimed ratios of etch compositions exhibit the claimed etch rates. On the contrary, the claims are directed only to those etch compositions that have the desired etch rates. The etch compositions claimed and which have a desired etch rate are a subset of the claimed ratios for the etch composition. Tsai et al., on the other hand, does not teach the entire range of ratios that are claimed in the present invention, and Tsai et al. is silent regarding etch rates. Therefore, it is not necessarily inherent that Tsai et al. teaches the claimed etch rates, e.g., chemical compositions not taught in Tsai et al. may possess the desired etch rates as recited in the claims of the present invention.

In addition, the fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic. *See M.P.E.P.* § 2112. "To establish inherency, the extrinsic evidence 'must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.'" *In re Robertson*, 169 F.3d 743, 745, 49 U.S.P.Q.2d 1949, 1950-

**Amendment and Response**

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Serial No.: 09/560,268

Confirmation No.: 2517

Filed: 26 April 2000

For: COMPOSITION FOR SELECTIVELY ETCHING AGAINST COBALT SILICIDE (As Amended)

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51 (Fed. Cir. 1999) (citations omitted). Here, Tsai et al. does not describe etch rates at all, and the claimed etch rates are not "necessarily present" in the compositions of Tsai et al. As such, inherency cannot be established based on Tsai et al.

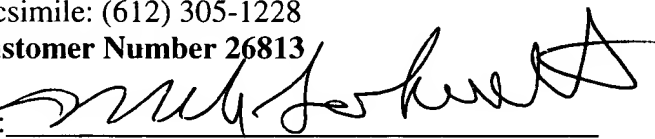
**Summary**

It is respectfully submitted that the pending claims are in condition for allowance and notification to that effect is respectfully requested. The Examiner is invited to contact Applicants' Representatives, at the below-listed telephone number, if it is believed that prosecution of this application may be assisted thereby.

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**CERTIFICATE UNDER 37 C.F.R. § 1.10:**

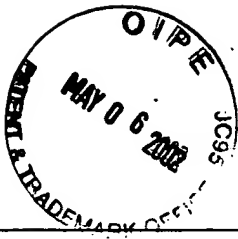
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The undersigned hereby certifies that this paper is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR §1.10 on the date indicated above and is addressed to the Assistant Commissioner for Patents, BOX RCE, Washington, D.C. 20231.

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**APPENDIX A - PENDING CLAIMS**

**Serial No.: 09/560,268**

**Docket No.: 150.0056 0102**

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For convenience, all pending claims are shown below.

64. An etching composition, the composition comprising a mineral acid, a peroxide, and deionized water at a ratio in a range of about 1:1:35 (mineral acid:peroxide:deionized water) to about 1:1:5 (mineral acid:peroxide:deionized water).
65. The etching composition according to claim 64, wherein the mineral acid is HCl and the peroxide is hydrogen peroxide.
66. The etching composition according to claim 64, wherein the ratio is in a range of about 1:1:25 (mineral acid:peroxide:deionized water) to about 1:1:10 (mineral acid:peroxide:deionized water).
67. The etching composition according to claim 64, wherein the mineral acid is selected from the group consisting of HCl, HNO<sub>3</sub>, H<sub>2</sub>SO<sub>4</sub>, H<sub>3</sub>PO<sub>4</sub>, and HF.
68. An etching composition, the composition comprising a mineral acid, a peroxide, and deionized water at a ratio in a range of about 1:1:35 (mineral acid:peroxide:deionized water) to about 1:1:5 (mineral acid:peroxide:deionized water), wherein the composition has an etch rate greater than about 1000 Å/minute for cobalt.
69. The etching composition according to claim 68, wherein the mineral acid is HCl.
70. The etching composition according to claim 68, wherein the peroxide is hydrogen peroxide.

71. The etching composition according to claim 68, wherein the ratio is in a range of about 1:1:25 (mineral acid:peroxide:deionized water) to about 1:1:10 (mineral acid:peroxide:deionized water).

72. The etching composition according to claim 68, wherein the composition has an etch rate of about 50 Å/minute to about 250 Å/minute for metal nitride.

73. An etching composition, the composition comprising a mineral acid, a peroxide, and deionized water at a ratio in a range of about 1:1:35 (mineral acid:peroxide:deionized water) to about 1:1:5 (mineral acid:peroxide:deionized water), wherein the composition has an etch rate of about 50 Å/minute to about 250 Å/minute for metal nitride.

74. The etching composition according to claim 73, wherein the mineral acid is HCl.

75. The etching composition according to claim 73, wherein the peroxide is hydrogen peroxide.

76. The etching composition according to claim 73, wherein the ratio is in a range of about 1:1:25 (mineral acid:peroxide:deionized water) to about 1:1:10 (mineral acid:peroxide:deionized water).

77. An etching composition, the composition comprising a mineral acid, a peroxide, and deionized water, wherein the composition has an etch rate of about 50 Å/minute to about 250 Å/minute for metal nitride and an etch rate greater than about 1000 Å/minute for cobalt.

78. The etching composition according to claim 77, wherein the mineral acid is HCl and the peroxide is hydrogen peroxide.

79. An etching composition, the composition comprising a mineral acid, a peroxide, and deionized water, wherein the composition has an etch rate of about 50 Å/minute to about 250 Å/minute for metal nitride.

80. The composition according to claim 79, wherein the mineral acid is HCl and the peroxide is hydrogen peroxide.

81. The etching composition according to claim 80, wherein the composition comprises a ratio in a range of about 1:1:35 (mineral acid:peroxide:deionized water) to about 1:1:5 (mineral acid:peroxide:deionized water).

82. The etching composition according to claim 81, wherein the composition comprises a ratio in a range of about 1:1:25 (mineral acid:peroxide:deionized water) to about 1:1:10 (mineral acid:peroxide:deionized water).

83. The composition according to claim 79, wherein the mineral acid is selected from the group consisting of HCl, HNO<sub>3</sub>, H<sub>2</sub>SO<sub>4</sub>, H<sub>3</sub>PO<sub>4</sub>, and HF.

84. An etching composition, the composition comprising a mineral acid, a peroxide, and deionized water, wherein the composition has an etch rate greater than about 1000 Å/minute for cobalt.

85. The composition according to claim 84, wherein the mineral acid is HCl and the peroxide is hydrogen peroxide.

86. The etching composition according to claim 85, wherein the composition comprises a ratio in a range of about 1:1:35 (mineral acid:peroxide:deionized water) to about 1:1:5 (mineral acid:peroxide:deionized water).

87. The etching composition according to claim 86, wherein the composition comprises a ratio in a range of about 1:1:25 (mineral acid:peroxide:deionized water) to about 1:1:10 (mineral acid:peroxide:deionized water).

88. The composition according to claim 84, wherein the mineral acid is selected from the group consisting of HCl, HNO<sub>3</sub>, H<sub>2</sub>SO<sub>4</sub>, H<sub>3</sub>PO<sub>4</sub>, and HF.

89. An etching composition, the composition consisting essentially of a mineral acid, a peroxide, and deionized water, wherein the composition has an etch rate of about 50 Å/minute to about 250 Å/minute for metal nitride and an etch rate greater than about 1000 Å/minute for cobalt.

90. The composition according to claim 89, wherein the mineral acid is HCl and the peroxide is hydrogen peroxide.

91. The composition according to claim 90, wherein the composition comprises a ratio in a range of about 1:1:35 (mineral acid:peroxide:deionized water) to about 1:1:5 (mineral acid:peroxide:deionized water).

92. The composition according to claim 91, wherein the ratio is in a range of about 1:1:25 (mineral acid:peroxide:deionized water) to about 1:1:10 (mineral acid:peroxide:deionized water).

93. The composition according to claim 89, wherein the mineral acid is selected from the group consisting of HCl, HNO<sub>3</sub>, H<sub>2</sub>SO<sub>4</sub>, H<sub>3</sub>PO<sub>4</sub>, and HF.

94. (New) An etching composition, the composition comprising a mineral acid, a peroxide, and deionized water at a ratio in a range of about 1:1:35 (mineral acid:peroxide:deionized water) to about 1:1:5 (mineral acid:peroxide:deionized water), wherein the mineral acid is selected from



the group consisting of HCl diluted to 37% by weight in deionized water, HNO<sub>3</sub> diluted to 70% by weight in deionized water, H<sub>2</sub>SO<sub>4</sub> diluted to 96% by weight in deionized water, H<sub>3</sub>PO<sub>4</sub> diluted to 85% by weight in deionized water, and HF diluted to 49% by weight in deionized water, wherein the peroxide is selected from the group consisting of hydrogen peroxide diluted to 29% by weight in deionized water, and ozone.

95. (New) The etching composition according to claim 94, wherein the mineral acid is HCl and the peroxide is hydrogen peroxide.

96. (New) The etching composition according to claim 94, wherein the ratio is in a range of about 1:1:25 (mineral acid:peroxide:deionized water) to about 1:1:10 (mineral acid:peroxide:deionized water).